Application of ANCAP Safety Ratings to Vehicle Model Variants

June 2016

ANCAP is Australasia's leading independent vehicle safety advocate providing consumers with transparent advice on vehicle safety through its safety rating program.

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Purpose

To set out the policy for applying published ANCAP safety ratings to other variants of a tested model of vehicle.

In brief

The criteria set out in Tables 1 to 4 are applied by default, when assessing variants that differ from the tested variant of a vehicle model. Appendix A sets out the types of evidence that would need to be provided by manufacturers to support the rating of variants that do not meet the criteria in Tables 1 to 4. Manufacturer's data cannot be used to increase the ANCAP safety rating of a variant.

Background

NCAP organisations usually test and rate one variant of a vehicle model. Other variants may differ from the tested vehicle in a number of ways. These factors include: body style, engine, transmission (including 4x4 vs. 4x2), left- or right-hand drive, mass and mass distribution, and safety features. These can all be expected to influence the crash test results to some degree. Generally NCAPs do not make any claims or statements about non-tested variants.

"Stars on Cars" programs, where NCAP ratings are displayed on vehicles in showrooms, can be limited by the lack of published ratings for some variants of a model range. Furthermore, as more and more vehicles achieve top ratings, manufacturers are keen to have these ratings apply to other variants of the model.

To determine the safety rating of variants, one option is for manufacturers to sponsor additional NCAP crash tests of these variants. However, to minimise this need and associated cost of doing so, agreed guidelines have been developed for identifying that a variant was equivalent to the tested vehicle for ANCAP rating purposes.

This document, also referred to as the ANCAP Variant Policy, sets out ANCAP policy for these situations. It also covers cases where vehicles have been modified in ways that might affect the ANCAP safety rating.

In 2012 the ***ANCAP Rating Road Map*** introduced additional requirements for achieving ANCAP safety ratings. In particular, vehicles must meet minimum requirements for pedestrian protection, whiplash protection and safety assist technologies (SAT). These additional requirements need to be taken into account for variants of, and modification to, vehicles that have an ANCAP rating year of 2012 or later.

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In 2014 ANCAP introduced arrangements for **Transition to Alignment with Euro NCAP**. This includes provision for publication of "Euro NCAP pathway" ratings. Where applicable, OEMs must demonstrate that the Australasian-specification SAT used for scoring the Safety Assist component of the Euro NCAP rating have the same or better performance than the SAT tested by Euro NCAP.

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Criteria for comparable speed assist systems (SAS), autonomous emergency braking (AEB) and lane support systems (LSS) are set out in Table 4**.** For example, if a Euro NCAP pathway rating needs a score

for AEB-interurban to meet 5-star requirements for Safety Assist and the OEM wishes to extend that rating to another variant then the items set out Table 4 (S2) need to be addressed.

Criteria for applying ratings to other variants

The likely influence of key factors is considered in the following table, together with proposed criteria that should be met in order for the variant to receive the same ANCAP safety rating as the tested variant. In some cases, the variant might receive a lower score and possibly a lower safety rating than the tested variant.

Where any of the applicable criteria in Tables 1-4 are not met, additional evidence will be required as set out in Appendix A.

Table 1: Criteria for comparable occupant protection

Factor	Criterion
a) Body style (e.g. 3-door hatch, 5-door hatch, sedan, coupe, wagon)	For the purpose of assessment a transverse vertical plane is defined that is 500mm rearward of the upper seat belt anchorage point for the driver seat. Forward of this plane variants must be identical in design and structure for crashworthiness purposes. A statement from the vehicle manufacturer is acceptable for this purpose, subject to visual verification. This includes the front seat belt anchorages but not rear seat belt anchorages. For example, a 3 door hatch result cannot be used for a 5 door hatch variant and vice-versa, without *additional evidence for all tests*. However, a sedan or wagon variant might be interchangeable with a 5 door hatch.
b) Kerb mass	Variation up to ±10% is allowed. Additional evidence (offset test) is required for larger variations.
c) Engine (displacement, cylinder configuration, aspiration, block size, type of fuel)	The same block size & configuration is allowed, irrespective of displacement, aspiration and fuel. Extra components within the engine bay such as LPG convertors and turbo-chargers are acceptable provided that footwell and pedal intrusion are well controlled in the tested vehicle (i.e. 4 points scored for driver's feet - this means that pedal rearward displacement is under 100mm and there is no footwell rupture). Note that a 4 cylinder result cannot be used for a V6 result and a V6 result cannot be used for a V8, and vice versa, without *additional evidence for the offset test*. Engine differences are acceptable for the side impact and pole tests.
d) Transmission (manual or auto, number of gears)	Any transmission is acceptable. Note that ANCAP policy for selection of test vehicles is that an automatic transmission will only be selected if at least 80% of that variant sales are automatic.
e) Driven wheels (4x4, 4x2, front-wheel drive, rear wheel drive)	Two wheel drive results (either front or rear) are not interchangeable with an all-wheel-drive variant without *additional evidence* (*offset test*) due to the effect of the rear driveline. Similarly front-wheel drive results are not interchangeable with rear-wheel-drive results, without additional evidence. Driven wheel differences are acceptable for the side impact and pole tests.
f) Ride height (e.g. height of top of wheel arch) and tyre diameter	*Offset test* acceptable provided that the ride height does not vary by more than +/-50mm from the tested variant. *Side impact test* of lowest variant may be used for other variants. Variants more than 50mm lower than the tested variant require additional evidence for the side impact test.
g) Wheelbase	Wheelbase variation up to ±10% is acceptable. Additional evidence (offset test) is required for larger variations.
h) Driver location (left-hand-drive, right-hand drive)	Where ANCAP has published a rating based on crash tests of a left-hand-drive variant, that rating may be applied to other variants in Australasia subject to meeting the relevant criteria in this table.
i) Front occupant restraint systems	Subject to items j) to m), installed airbags must be the same as the tested variant, or better. For example, for the purpose of the side impact test, curtains may be fitted where the tested variant had seat-mounted side airbags with head protection. However, *additional evidence* is required for the pole test, where the type of head-protecting side airbag is different. Front seat belt pretensioners and load limiters must be identical. Front seat belt anchorages must be identical in geometry and adjustment features. Seat design must have similar restraint-related features, such as anti-submarining pans. Upholstery and adjustment features may vary.
j) Lack of passenger front airbag	*Offset test* results for a variant with a front passenger airbag may be used for a variant without a front passenger airbag but a score deduction normally applies. Where a Euro NCAP tested variant had a front passenger airbag and the variant being assessed does not have this then a 2-point deduction is applied to the front passenger head score (*offset test*), unless *additional evidence* is provided.

k) Lack of head-protecting side airbag (not high seat vehicle*)	Where a tested variant had a head-protecting side airbag and the variant being assessed does not have this then a 2-point deduction is applied to the head score (*side impact test*), unless *additional evidence* is provided. Test data from an acceptable ADR72 crash test would be suitable for this purpose.
l) Lack of thorax-protecting side airbag (not high seat vehicle*)	Where a tested variant had a thorax-protecting side airbag and the variant being assessed does not have this then a 2-point deduction is applied to the chest score (*side impact test*), unless *additional evidence* is provided. Acceptable ADR72 test data would be suitable for this purpose but 2-point deduction applies where these data do not include dummy backplate or T12 measurements.
m) Lack of knee airbag	Where a tested variant had a knee airbag and the variant being assessed does not have this feature available then a 2 point deduction is applied to the driver/passenger upper leg score (*offset test*) unless *additional evidence* is provided.
n) Other safety features	Intelligent seat belt reminders are assessed and scored for each variant. Therefore variants with different numbers of seat belt reminders will have different scores and possibly different safety ratings. Similarly, Safety Assist Technologies (SAT) may be assessed and scored for each variant therefore a change in SAT might affect the safety rating. Several mandatory SAT, such as ESC, are required for some safety ratings. Variants that are not eligible for a particular safety rating due to a lack of a mandatory SAT will be assigned the next lower safety rating and the overall score will be truncated to the maximum available for that (lower) safety rating.

** "High seat vehicle" is a vehicle with a seating reference height more than 700mm and so is exempt from the ADR72 side impact test. ANCAP applies a default 16 points for these vehicles, unless a Euro NCAP test result is available that is less than 16 points.*

Table 2: Criteria for comparable pedestrian protection

Factor	Criterion
P1) Head impact zones	Where under-bonnet clearances are less than the tested variant and are within 50mm of the bonnet exterior outer surface *additional evidence* is required (pedestrian headform impact tests). Similarly, *additional evidence* is required where the stiffness of components within the prescribed adult and child head impact zones (and to a depth of 50mm below the exterior outer surface) is likely to be greater than the tested variant.
P2) Upper leg impact zones	Where the leading edge of the bonnet is changed in geometry or the stiffness of components within the prescribed zone is likely to be greater than the tested variant then *additional evidence* is required (pedestrian upper legform test).
P3) Lower leg impact zones	Where the front bumper bar is changed in geometry or the stiffness of components within the prescribed zone is likely to be greater than the tested variant then *additional evidence* is required (pedestrian lower legform test).
P4) Additional pedestrian protection devices	Where a tested variant has a supplementary system for pedestrian protection, such as a pop-up bonnet or pedestrian-rated autonomous emergency braking (AEB), that system must be fitted to, and operate as intended, on the variant. Otherwise *additional evidence* is required (pedestrian tests).
P5) Ride height	The impact points for pedestrian protection tests depend on the ride height of the vehicle. Where the ride height varies from the tested variant by more than +/-50mm *additional evidence* is required (all pedestrian tests).

Table 3: Criteria for comparable whiplash protection

Factor	Criterion
W1) Seat design	Cosmetic changes such as upholstery materials are acceptable. Where a different seat structure or mounting is used or the seat geometry is changed (other than due to easily compressible materials) *additional evidence* is required (static and whiplash dynamic tests). Control changes (electric/memory vs. manual) are acceptable.
W2) Restricted rearward movement of seat back	Additional structures rearward of the driver seat are acceptable. For example, a dual cab whiplash rating can be applied to a single cab variant. Note that this policy may be reviewed if the RCAR consortium subsequently issues an amended protocol that takes into account structures to the rear of the seat for the purpose of the dynamic whiplash test.

Table 4: Criteria for comparable Safety Assist systems (Euro NCAP Pathway)

Factor	Criterion
S1) Speed Assist Systems	Where the following functions were awarded points by Euro NCAP they must use the same components, human-machine-interface and software as the system awarded points by Euro NCAP: a) Camera-based speed limit information function (SLIF) - e.g. optical sign recognition. b) Digital map-based speed limit information function (SLIF) - e.g. speed limits displayed in a sat-nav system c) Combined camera and digital map systems d) Manual speed assistance (MSA) speed warning - e.g. audible alarm e) Manual speed assistance (MSA) speed limitation function - e.g. cannot accelerate beyond the selected speed f) Intelligent speed assistance (ISA) - speed limit information function linked to a warning function and/or a speed limitation function Where these conditions are not met *additional evidence (speed assist*) is required.
S2) Autonomous Emergency Braking	Where the following types of AEB were awarded points by Euro NCAP they must use the same components, human-machine-interface and software as the system awarded points by Euro NCAP: a) AEB City b) AEB inter-urban c) AEB Vulnerable Road User (VRU) For each type of AEB: i. the system must have the same or better performance than the system assessed by Euro NCAP ii. functional components (e.g. LIDAR, radar transmitter & receiver, and mono or stereo cameras) must be the same brand, model and series as tested by Euro NCAP iii. AEB software must be the same or a later version than that tested by Euro NCAP iv. all transmitter, receiver and camera locations must be the same as that tested by Euro NCAP. Where these conditions are not met *additional evidence (AEB*) is required.
S3) Lane Support Systems	Where the following types of LSS were awarded points by Euro NCAP they must use the same components, human-machine-interface and software as the system awarded points by Euro NCAP: a) Lane Departure Warning (LDW). b) Lane Keep Assist (LKA). Where these conditions are not met *additional evidence (LSS*) is required.

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Refer to the ***ANCAP Notes on the Assessment Protocol*** and the ***ANCAP Rating Road Map*** for more information about the ANCAP safety rating system.

APPENDIX A

Additional evidence to be provided by the vehicle manufacturer, where indicated in Tables 1-4.

The manufacturer's submission should address each of the technical items set out in Tables 1-4, indicating whether the criteria are met.

Where a manufacturer seeks to apply an ANCAP safety rating to a variant that does not meet the criteria set out in Tables 1-4, further engineering evidence is required to show that the additional variant provides at least the same level of occupant protection as the tested variant for the type of crash test under consideration. This appendix sets out requirements for this additional evidence.

Additional evidence may also be submitted where ANCAP proposes to use default deductions, for example, due to a lack of side airbags (j) & m) in Table 1.

Manufacturers may also submit evidence to show that an ANCAP safety rating should not be applied to a particular variant, despite it meeting the criteria of Tables 1-4.

Submissions from manufacturers might be circulated within the ANCAP Technical Working Group on a confidential basis.

Crash performance comparisons

The main purpose of the test data is to show comparable performance so that the existing ANCAP test results can be applied to the additional variant or to show that the additional variant performs better than that derived from a default score (e.g. where ANCAP proposes to apply a 2 point deduction due to the absence of airbags). Manufacturer's test data is not acceptable for deriving a higher safety rating for an additional variant - only ANCAP or other acceptable NCAP test data may be used for this purpose.

Acceptable engineering comparisons include:

- **a)** Crash tests for related regulation compliance tests, at regulation speeds or higher (such as ADR72 and ADR73).
- **b)** Crash tests at NCAP speeds conducted according to ANCAP / Euro NCAP protocols by or on behalf of the manufacturer at an approved test facility (e.g. acceptable for ADR certification purposes).
- **c)** An ADR85 Oblique Pole test, FMVSS 214, GTR 14 or UNECE R135 may be used to demonstrate the effectiveness of a head-protecting side airbag/curtain, as an alternative to a 90 degree pole test.
- **d)** Results of computer modelling should show comparable structural deformation (including footwell and firewall) and vehicle body deceleration. MADYMO modelling, or equivalent, of dummy responses is preferred.

The tested models should be built to Australian specifications, but overseas specifications (e.g. comparisons between two LHD variants) may be acceptable.

Manufacturer's representatives are encouraged to contact ANCAP to discuss the types of evidence that are proposed to be submitted. In general only summary test data, that identifies the vehicle, the type of test, the test facility and the key injury and deformation measurements, is required by ANCAP.

Crash test comparisons

Where crash tests are compared the injury values for the additional variant should not exceed those in the ANCAP / Euro NCAP tested variant by more than 10% unless:

- **a)** the resulting injury scores are in the good range (i.e. score 4 points under the ANCAP assessment protocol); or
- **b)** the resulting crash test and overall scores for the variant are sufficient to retain the same safety rating as the tested variant.

Pedestrian protection comparisons

Where the safety rating of a tested variant depends on a minimum pedestrian protection (PP) rating then adult headform, child headform, upper legform and lower legform performance may need to be assessed.

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For each relevant type of test (see Table 2) the test points used for the tested variant should be determined from the ANCAP / Euro NCAP test lab report. Testing may be confined to locations affected by the variation and the resulting scores combined with the original test results.

A computer simulation for both the rated variant and variant being assessed is an acceptable alternative to a physical test.

Where extra tests are performed the resulting overall score should be sufficient, when combined with the remaining (unaffected) scores for the rated variant, to achieve a pedestrian protection rating that meets the ANCAP Rating Road Map requirements (ANCAP pathway) or the required pedestrian protection (PP) score for the Euro NCAP pathway.

Whiplash protection comparisons

Where the safety rating of a tested variant depends on a minimum whiplash rating then static and dynamic whiplash performance may need to be assessed.

Whiplash static test

Where an extra static whiplash test is performed (to RCAR or Euro NCAP protocols) the resulting rating should be sufficient, when combined with the dynamic test result to achieve a whiplash rating that meets the ANCAP Rating Road Map requirements or the Euro NCAP requirements, if applicable (Euro NCAP pathway). Note that, in accordance with the RCAR protocol, a minimum static rating of "Acceptable" is required in order to proceed with a dynamic test.

It is preferred that whiplash static testing is arranged by the IAG Research Centre in Newington (Sydney).

Whiplash dynamic test

Where an extra dynamic whiplash tests are performed (to RCAR or Euro NCAP protocols) the resulting score should be sufficient, when combined with the static test result, to achieve a whiplash rating that meets the ANCAP Rating Road Map requirements (ANCAP pathway) or the required AOP score for the Euro NCAP pathway.

Speed assist systems (SAS)

Where the safety rating (via the Euro NCAP pathway) of a tested variant depends on a minimum score for SAS then the components that received a score from Euro may need to be assessed for other variants.

Testing and scoring should be performed in accordance with the relevant Euro NCAP Test Protocol using same, or a later, version as that used by Euro NCAP.

The resulting score should be sufficient to achieve the required Safety Assist score for the Euro NCAP pathway.

ANCAP will apply the Euro NCAP score for camera-based SLIF if the OEM provides a statement that the system fitted to the vehicle is capable of being tuned to Australian/New Zealand conditions and that the OEM is committed to doing this within two years[**].

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ANCAP will apply the Euro NCAP SAS score for digital map-based SLIF if the OEM provides a statement that the system fitted to the vehicle is capable of using Australian/New Zealand digital map-based speed limit data and that they are committed to implementing this within two years[**]. In this case the OEM should be prepared to demonstrate that the system works in at least one city in Australia or New Zealand as soon as possible after the model launch.

[**] This two year concession ceases from 2018.

Autonomous emergency braking (AEB)

Where the safety rating (via the Euro NCAP pathway) of a tested variant depends on a minimum score for AEB then the systems that received a score from Euro may need to be assessed for other variants.

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Testing and scoring should be performed in accordance with the relevant Euro NCAP Test Protocol using same, or a later, version as that used by Euro NCAP.

The resulting scores should be sufficient to achieve the required AOP/Pedestrian/Safety-Assist score for the Euro NCAP pathway.

Lane support systems (LSS)

Where the safety rating (via the Euro NCAP pathway) of a tested variant depends on a minimum score for LSS then the system that received a score from Euro may need to be assessed for other variants.

Jun 16 Testing and scoring should be performed in accordance with the relevant Euro NCAP Test Protocol using same, or a later, version as that used by Euro NCAP.

The resulting score should be sufficient to achieve the required Safety-Assist score for the Euro NCAP pathway.

Covering letter from company management

It is necessary for a covering letter, signed by a senior company representative, to be submitted confirming that the submitted data is accurate and seeking an ANCAP rating of the variant(s). This is necessary so that ANCAP has traceable evidence of the reason for assigning a safety rating without crash testing the variant.

Example letter:

James Goodwin
Chief Executive Officer
ANCAP Australasia Ltd
PO Box 4041
MANUKA ACT 2603
...

This letter confirms the technical advice provided to ANCAP by Mr [XXX] from our company. I can confirm that:

a) ADR 72 and 73 crash test data for the [XXX] variant(s) of the [XXX] were used for ADR certification of the [XXX] variant. No equivalent crash test results are available for the [XXX] variant as it was not necessary for ADR certification purposes.
b) The structure and restraint systems relevant to front seat occupant protection are effectively the same as the rated model for ANCAP frontal offset, side impact and pole impact crash tests.

It is requested that ANCAP issues safety ratings for the [XXX] variant(s) based on the ANCAP safety rating of the [XXX] variant.

Yours...
[signed by a senior company representative in Australia]

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